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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
| 10/585,729 | 07/12/2006 | Tadashi Maeda | 043890-0927 | 7206 |
| 20277 7590 08/25/2009 MCDERMOTT WILL & EMERY LLP 600 13TH STREET, N.W. WASHINGTON, DC 20005-3096 | | | | |
| EXAMINER SAAD, ERIN BARRY | | | | |
| ART UNIT | | PAPER NUMBER | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/585,729

Applicant(s)

MAEDA ET AL.

Examiner

ERIN B. SAAD

Art Unit

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 August 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) 1-3 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SF/ICE)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/3/2009 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al (US 6,189,771) in view of Mei (US 6,680,128), and further in view of the collective teachings of Kudas (US 6,951,666) and Kang et al (US 5,837,119).

In regards to claim 4, Maeda teaches a method for soldering a first electrode with a solder portion to a second electrode, as observed in the sequences depicted in figures 3A-3E, where electrode 18 and electrode 12 are the first and second electrode, respectively, using a metal (solder) paste that is coated with flux comprising either tin, lead, zinc, gold, silver, copper, antimony, indium, or bismuth filled between the soldering portion and the second electrode by positioning the first electrode directly above the second electrode where the metal paste is within the cavity (metal paste 5, figures 3A-3E). Maeda discloses letting solder come in contact with the first electrode and the second electrode by melting the solder under heat and wetting and spreading the molten solder along the surface of the metal powder guiding/directing the molten solder (column 3 lines 22-35 and column 4, lines 23-35).

Maeda teaches that the metal paste is made by mixing a metal and flux (column 4, lines 1-4). However, Maeda fails to teach that the paste includes a liquid basis formed of resin component, an activator removing oxide film produced on surfaces of the solder portion, a metal powder having at least flake-like shaped metal powder including a core

metal and a surface metal to cover surfaces of the core metal, as well as the metal powder having at least a flake-like shaped figure.

However, Mei teaches solder pastes where a particular solder composition is most preferably a metal alloy of tin and zinc (core metal) coated with a material preferably selected from copper, silver, palladium, tin, or gold (Column 2, lines 19-24). Mei also teaches that the coated solder composition used in the solder paste is also suitable for being combined with a flux containing a rosin, derivatives of a rosin such as a dimerized resin, an activator, and a solvent (Column 4, lines 40-49), thus the paste would have a sense of liquidity (liquid basis). Where the solder composition is mixed with the flux to form a roughly 50-50 mix of flux and solder composition (column 4, lines 60-62), thus for it to be a paste it would be necessarily inherent that the paste would have liquidity since, in regards to the particular limitation of claim 4, reciting that the surface metal would be dissolved into the core metal, this would inherently happen depending on the thickness of the surface metal that is coating the core since it is exposed to the reflow process directly (column 4, lines 8-11).

In view of Mei's teachings, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine, with Maeda's soldering method that solders together two electrodes by a soldering bump through the use of a soldering paste, a particular soldering paste that contains a core and surface metal, since using a paste that contains a core and surface metal would allow for lower melting points, longer shelf life, and better effective wettability properties (Mei, Column 3, lines 5-10).

Kodas teaches the use of metal powders that have a flaky form with very large aspect ratios (column 4, lines 60-66) to form conductive features (column 35, lines 1-18). Where according to Kang et al, soldering or electrically conductive pastes (column 2, lines 20-25) with metal powders in the flaky form because of their higher aspect ratios are more desirable than metal powder in the regular spherical form because flaky powders provide for better electrical conduction because of their larger aspect ratios, i.e. length of the flake is larger than the width of the flake (Kang, column 5, lines 35-40).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Maeda in view of Mei to use flake-like metal powders since their higher aspect ratios allow for better electrical conduction, as taught by the collective teachings of Kodas and Kang.

In regards to claim 5, Wherein the core metal is selected from the group of tin, zinc, lead, and indium, and the surface metal includes any one of gold and silver, Mei teaches that the solder composition (core metal) can be either tin or zinc, while the coating material (surface metal) can be either copper, silver, palladium, tin, or gold (Column 2, lines 19-24).

In regards to claim 6: wherein the core metal includes tin or tin-based alloy, and the surface metal includes silver (Mei, column 2, lines 19-24).

In regards to claim 7: The soldering paste of claim 4, wherein amount of the metal powder is 1-20 vol % (Kodas, column 35, lines 1-15, where the precursor composition is the soldering paste and includes metals such as silver (metal particle, column 24, lines 35-38, where it is mentioned before that these particles may be flakes)

and tin (molecular metal precursor, column 24, line 37) used for solder replacements or high conductive features (column 35, lines 10-16), and where Kodas discloses that the precursor composition includes between 20 and 50% vol percent metal powder (column 27, lines 62-67), thus rendering the instant claim obvious.

Response to Arguments

5. Applicant's arguments filed 7/1/2009 have been fully considered but they are not persuasive.
6. The Applicant argues that the prior art Maeda and Mei fail to disclose the use of flake-like shaped metal powder and the prior art Kodas and Kang fail to disclose that the metal powder has function of guiding the molten solder in the reflow process.

As stated above, Maeda and Mei are silent to the shape of the metal powder. Kodas and Kang disclose flaky-shaped metal particles. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Maeda in view of Mei to use flake-like metal powders since their higher aspect ratios allow for better electrical conduction, as taught by the collective teachings of Kodas and Kang. While Kodas and Kang do not disclose metal powder has function of guiding the molten solder in the reflow process, Maeda does disclose spreading the molten solder along the surface of the metal powder guiding/directing the molten solder (column 3 lines 22-35).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ERIN B. SAAD whose telephone number is (571)270-3634. The examiner can normally be reached on Monday through Thursday from 8am-5pm Eastern time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on (571) 272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E. B. S./
Examiner, Art Unit 1793
8/17/2009

/Kevin P. Kerns/
Primary Examiner, Art Unit 1793